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Emergency Preparedness and Public Health: The Lessons of Hurricane Sandy

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The Lessons of Hurricane Sandy

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Before dawn on Tuesday morning, October 30, in the midst of flooding and damaging winds from Hurricane Sandy, New York University's (NYU's) most fragile patients, premature infants, were carried down 9 flights of stairs in the dark and transported to hospitals on dry ground.[1] Although the infants arrived safely, the mid-storm evacuation of these critically ill patients was concerning. A safer daylight transfer before flooding overwhelmed southern Manhattan would have been preferable. The Veterans Affairs (VA) New York Harbor hospital evacuated patients before the storm.[2] Bellevue, New York's flagship public hospital, evacuated patients in the immediate aftermath of the storm when the backup power supply failed.[3,4] These neighboring hospitals each made different decisions about when to evacuate. Across the New York City metro region, many hospitals, nursing homes, and assisted living facilities were evacuated, most of them after the storm hit, making this the central public health challenge of this calamitous event.

It is a familiar story—a superstorm comes ashore, infrastructure is overwhelmed, and health care facilities evacuate patients, with major delays in returning to normal functioning. Afterwards, policy makers evaluate lessons learned for the next disaster, but similar missteps are often repeated. Why did some health care facilities with the same risk level evacuate while others did not? Although the 2 storms were different in many ways, it is instructive to compare Hurricane Katrina with the still-unfolding events of Sandy.

Success Amidst Failure

The emergency hospital evacuations of 2 of Manhattan's landmark medical facilities—NYU Langone Medical Center evacuated 300 patients during the storm, and the next day Bellevue Hospital evacuated 700 patients—struck a similar chord to the catastrophic loss of medical infrastructure in New Orleans in 2005. Ad hoc decisions made in the midst of crisis cost patients their lives during Katrina and were second-guessed in the courts.

Unlike during Katrina, New York hospitals during Sandy had more detailed emergency plans and access to better-positioned backup generators, many placed on high floors to protect against flooding. Fuel pumps in some hospitals were left in basements because of building code restrictions but were encased in concrete to protect against floods. Indeed, NYU engineers prepared the hospital against an unprecedented 12-ft flood, but not the actual 14 ft that Sandy delivered, causing pumps to fail.

As a result of post-Katrina planning, New York hospitals had capabilities to manage evacuations, demonstrating a measure of success. Hospital staff had transport equipment to move patients within the facility; the federal Ambulance Contract developed in the wake of Katrina brought 350 additional ambulances to the city and ensured rapid response by emergency medical service transport units; the Department of Health and Human Services deployed more than 1000 disaster medical personnel to assist in the response and recovery; and the Federal Emergency Management Agency (FEMA) placed urban search and rescue teams nearby as the storm came ashore.

What seemed to be missing, however, were clear and consistent criteria to guide evacuation decisions. The Institute of Medicine (IOM) has stressed the importance of advance planning and protocols, with the ability to remain flexible in the face of new information.[5]

Evacuation decisions are complex—a decision to evacuate prematurely places patients at risk, whereas waiting too long can have devastating consequences. Hospitals are faced with a variety of factors, many of which are in tension—ranging from patient safety and lost revenue to communication and logistical capabilities. It is impossible to know the reasoning of hospital administrators during Sandy, but the VA acted decisively ahead of the storm, while 2 neighboring hospitals evacuated under far-from-ideal circumstances—which, in hindsight, appeared to have been the less optimal choice.

At least 1 New York hospital failed to learn a critical lesson from Katrina—planning for the transport of physically disabled or obese patients. Bellevue left 2 overweight patients sheltering in place[6] when elevators failed, although a

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timely preemptive move to a room on a lower floor might have minimized this risk.

Hospitals receiving evacuees had prepared for surge capacity. Consistent with IOM guidance, these hospitals shifted delivery of care along a continuum from conventional to contingency response, utilizing facilities to deliver care functionally equivalent to normal operating conditions.[5] Hospital lobbies served as patient reception areas, hallways accommodated patient beds, staff-to-patient ratios changed so that staff cared for more patients, and medical documentation requirements were adjusted. These strategies enabled hospitals to deliver care in a severely affected city.

Common Failures

The difficult lessons learned from Katrina did not result in hardened medical facilities capable of withstanding catastrophic flooding. Joint Commission accreditation standards updated after Katrina were designed to enable facilities to function alone for 96 hours, emphasizing backup power generation resistant to flooding and monthly capability tests. Yet these recommendations proved insufficient. Hospitals rarely placed their own vulnerabilities at the center of mandated disaster exercises, in part because of the ongoing need to provide patient care.

In the aftermath of Sandy, hospitals were unable to ensure continuity of operations, which is a hallmark of successful disaster plans. The Joint Commission urged the redesign of infrastructure for future hospital construction but considered retrofitting existing infrastructure cost-prohibitive. The latest disaster in New York City should reopen discussion regarding needed investments. The cost-benefit calculus must include the long-term impacts. Delayed reoccupancy of storm-damaged facilities has major public health implications, including limited access to care, financial strain on local facilities, and stress on regional health care systems that must accommodate the loss of medical capacity.

Both Katrina and Sandy highlighted the difficulty in attaining "situational awareness"—the data and insights needed to make strategic planning and response decisions. Loss of communications due to power failures, combined with inaccessibility to affected communities, caused delay in recognizing the fragile state of nursing homes, assisted living facilities, and hospitals. Public health authorities did not take charge to coordinate strategic decisions. Notably, before the storm, hospitals assured the mayor that "they were ready for whatever comes."[7]

The Future of Emergency Preparedness

Natural disasters are chaotic. Leaving crucial decisions to health care facilities results in inconsistent action, potentially adverse to patient and public interests. Public health and emergency management agencies should develop protocols, ensure capacity, and guide crucial decisions in a disaster. Public officials, in collaboration with facilities, should decide whether to shelter in place or risk transfer of fragile patients. The secretary of Health and Human Services should consider issuing an early public health emergency declaration to reduce legal concerns and regulatory constraints.

Investments to strengthen health care infrastructure to withstand catastrophic events may seem unrealistic under current fiscal restraints. However, the financial and public health consequences of failing to invest will result in predictable hospital failures in the next disaster. Where possible, investments should be coordinated across multiple institutions, using health care coalitions to ensure resiliency. For example, a joint venture linking neighboring Manhattan hospitals with shared equipment, supplies, infrastructure, and training would yield significant financial and health advantages. Although there are major barriers to cooperation among private, city, and federal authorities, harmonization of planning and response is essential to ensure patient safety.

Facilities will require additional resources—financial, material, and intellectual—to meet the challenges of disaster response. Investments should help ensure the operation of health care services during and after a disaster. Communities cannot avoid natural and man-made disasters, and the next event could be still more catastrophic. Federal, state, and municipal authorities can better prepare for the next disaster and have a duty to do so.

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